

---

**CORRECTIVE MEASURES STUDY  
WORK PLAN**

**Grenada Manufacturing Site  
Grenada, Mississippi**

prepared for

**ArvinMeritor  
Troy, Michigan**

June 2002

---

27-19071.001

**CORRECTIVE MEASURES STUDY  
WORK PLAN  
GRENADA MANUFACTURING SITE  
GRENADA, MISSISSIPPI**

**Prepared for:**

**ArvinMeritor  
Troy, Michigan**

**Prepared by:**

**BROWN AND CALDWELL  
501 Great Circle Road  
Suite 150  
Nashville, Tennessee 37228  
(615) 255-2288**

**June 2002**

**19071.001**

501 Great Circle Road  
Suite 150  
Nashville, Tennessee 37228  
Tel: (615) 255-2288  
Fax: (615) 256-8332  
www.browncaldwell.com  
June 28, 2002

27-19071.001

BROWN AND  
CALDWELL

Mr. Don Webster  
USEPA Region 4  
Atlanta Federal Center  
61 Forsyth Street, SW  
Atlanta, GA 30303-8960

RE: Corrective Measures Study Work Plan  
Grenada Manufacturing, LLC  
Grenada, Mississippi

Dear Mr. Webster:

On behalf of Grenada Manufacturing, LLC and ArvinMeritor, Brown and Caldwell is submitting three copies of the Corrective Measures Study (CMS) Work Plan for the referenced site. Two copies have also been sent to Mr. Louis Crawford at the Mississippi Department of Environmental Quality.

As discussed in your letter to Mr. Don Williams at Grenada Manufacturing dated November 26, 2001, the Work Plan addresses the evaluation of corrective measures for both source control and site-wide groundwater. The CMS will identify and evaluate the remaining HSWA-related cleanup activities to recommend a final corrective action remedy for the entire plant.

Please provide your comments regarding this Work Plan to Mr. Don Williams at Grenada Manufacturing. If you should have any questions, please feel free to call me at (615) 250-1241 or contact me by e-mail at [dshowers@brwncald.com](mailto:dshowers@brwncald.com).

Sincerely,

BROWN AND CALDWELL

Dale R. Showers, P.E.  
Project Manager  
Design & Solid Waste

cc: Louis Crawford, P.E., MDEQ  
John Bozick, ArvinMeritor  
Don Williams, Grenada Manufacturing, LLC  
Robert Ash, P.E., Brown and Caldwell

## CONTENTS

CONTENTS .....	i
TABLES .....	ii
FIGURES .....	ii
1.0 Introduction .....	1-1
1.1 Purpose .....	1-2
1.2 Description of Current Situation .....	1-2
1.3 RCRA Compliance Schedule.....	1-6
2.0 Overview of Interim Measures .....	2-1
2.1 Previous Interim Measures .....	2-1
2.2 Ongoing Interim Measures .....	2-2
2.3 Proposed Interim Measures.....	2-3
2.4 Other On-Site Activities to be Considered .....	2-3
3.0 Objectives of the Corrective Measures Study.....	3-1
3.1 Summary of Objectives .....	3-1
3.2 Proposed Target Media Cleanup Standards .....	3-2
3.3 Preliminary Points of Compliance.....	3-3
4.0 Identification and Evaluation of Corrective Measures Technologies .....	4-1
4.1 Source Control Measures .....	4-1
4.2 Migration Control Measures.....	4-1
4.3 Technology Evaluation.....	4-2
5.0 Implementation of Corrective Measures Study.....	5-1
5.1 Proposed Schedule for CMS Implementation .....	5-1
5.2 Proposed Outline for CMS Report.....	5-1
5.3 Project Organization and Management .....	5-1
5.4 Document Control.....	5-2
5.5 Data Management .....	5-2
5.6 Public Involvement Plan .....	5-3

## APPENDICES

- APPENDIX A. Solid Waste Management Unit Summary from HSWA Permit  
APPENDIX B. Compliance Schedule from HSWA Permit

## TABLES

<u>No.</u>		<u>Follows Page</u>
5-1	Example Outline for Corrective Measures Study Report.....	5-1

## FIGURES

<u>No.</u>		<u>Follows Page</u>
1-1	Site Location Map .....	1-1
1-2	Site Map Showing Locations of Remaining Solid Waste Management Units and Areas of Concern.....	1-1
1-3	Site Map Showing Locations of Interim Measures .....	1-1
5-1	Proposed Schedule for Corrective Measures Study Implementation.....	5-1

## 1.0 INTRODUCTION

This document contains the Corrective Measures Study (CMS) Work Plan for the Grenada Manufacturing, LLC facility (Site) located at 635 Highway 332 in Grenada, Mississippi (Figure 1-1). In accordance with the facility's Hazardous and Solid Waste Amendment (HSWA) Permit issued July 31, 1998, the facility is undergoing Resource Conservation and Recovery Act (RCRA) Corrective Action for prior and suspected ongoing releases of hazardous waste, including hazardous constituents from various solid waste management units (SWMUs). To that end, a CMS Work Plan for the Site has been required by the United States Environmental Protection Agency (USEPA) Region IV in its letter to Grenada Manufacturing dated November 26, 2001. According to the letter, the USEPA requests that the CMS Work Plan identify and evaluate the remaining HSWA-related cleanup activities to recommend a final corrective action remedy for the entire Site.

As discussed later in this Work Plan, the Baseline Risk Assessment (BRA) that has been performed for this Site concluded that the Site poses only potential "low-level" threats for all media except for groundwater in the uppermost aquifer. Therefore, the CMS will address Site-wide groundwater contamination, as well as source control and soil contamination as these impact the overall Site-wide groundwater remedy. Appendix A of the HSWA permit identifies SWMUs and Areas of Concern (AOCs) as either requiring a RCRA Facility Investigation (RFI) or requiring confirmatory sampling. For reference purposes, Appendix A of this Work Plan contains a copy of Appendix A from the HSWA permit for the facility. Figure 1-2 identifies these remaining SWMUs and AOCs in relationship to existing Site features. Other SWMUs (i.e., those not shown on Figure 1-2) identified in the HSWA permit were listed as requiring no further action (see Table A.2 of Appendix A for a list of these SWMUs).

The CMS will also consider the Interim Measures (IMs) that have been completed, are ongoing, or are proposed. These IMs will be evaluated as they relate to the overall Site-wide groundwater contamination and the final corrective action remedy for the Site. Figure 1-3 identifies the locations of these IMs in relationship to existing Site features and identified SWMUs and AOCs.

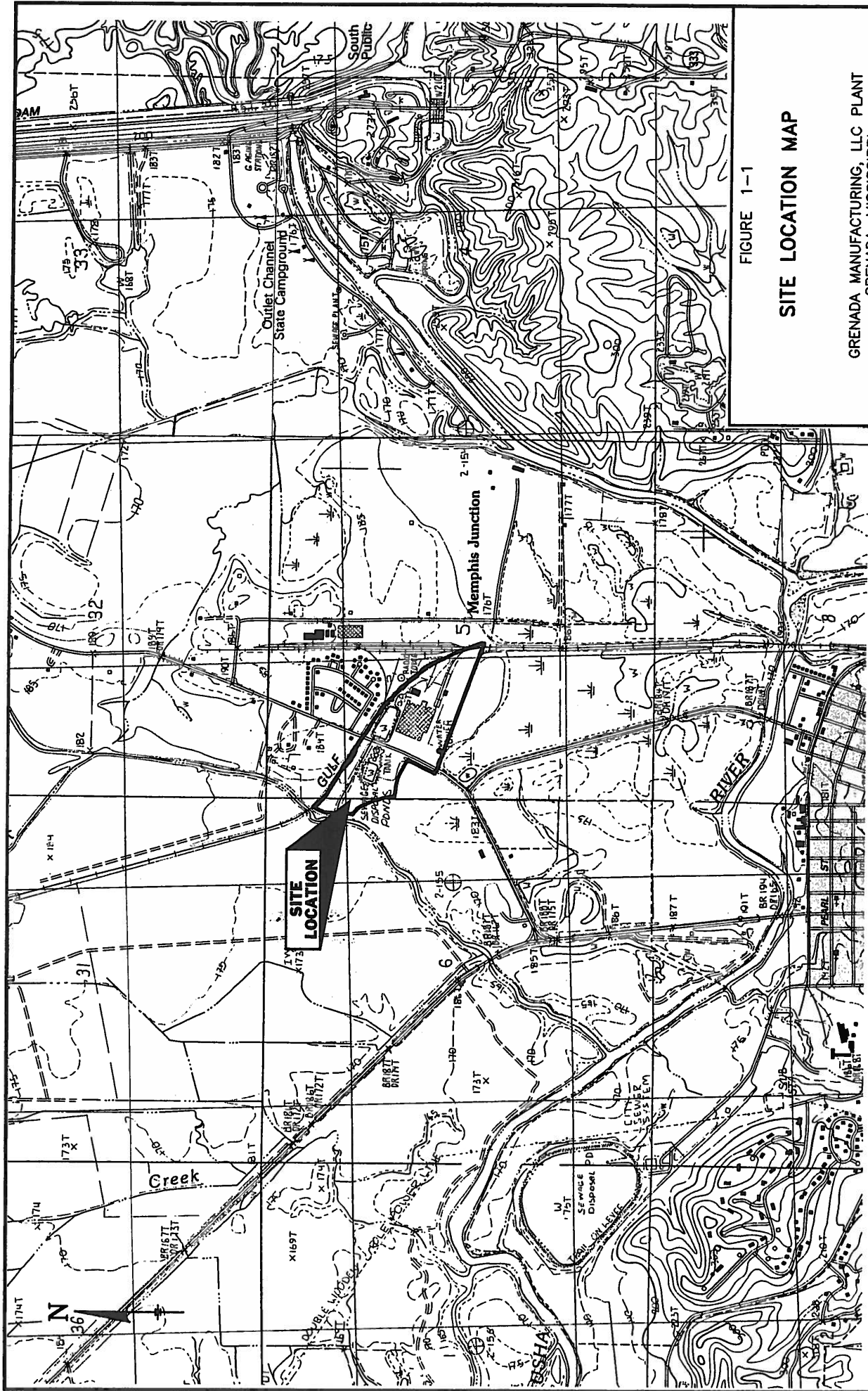


FIGURE 1-1

# SITE LOCATION MAP

GRENADA MANUFACTURING, LLC PLANT  
GRENADA, MISSISSIPPI

19071

06/02

Modified from U.S.G.S., Grenada, Mississippi  
Quadrangle, 1983.

**BROWN AND  
CALDWELL**

Nashville, Tennessee

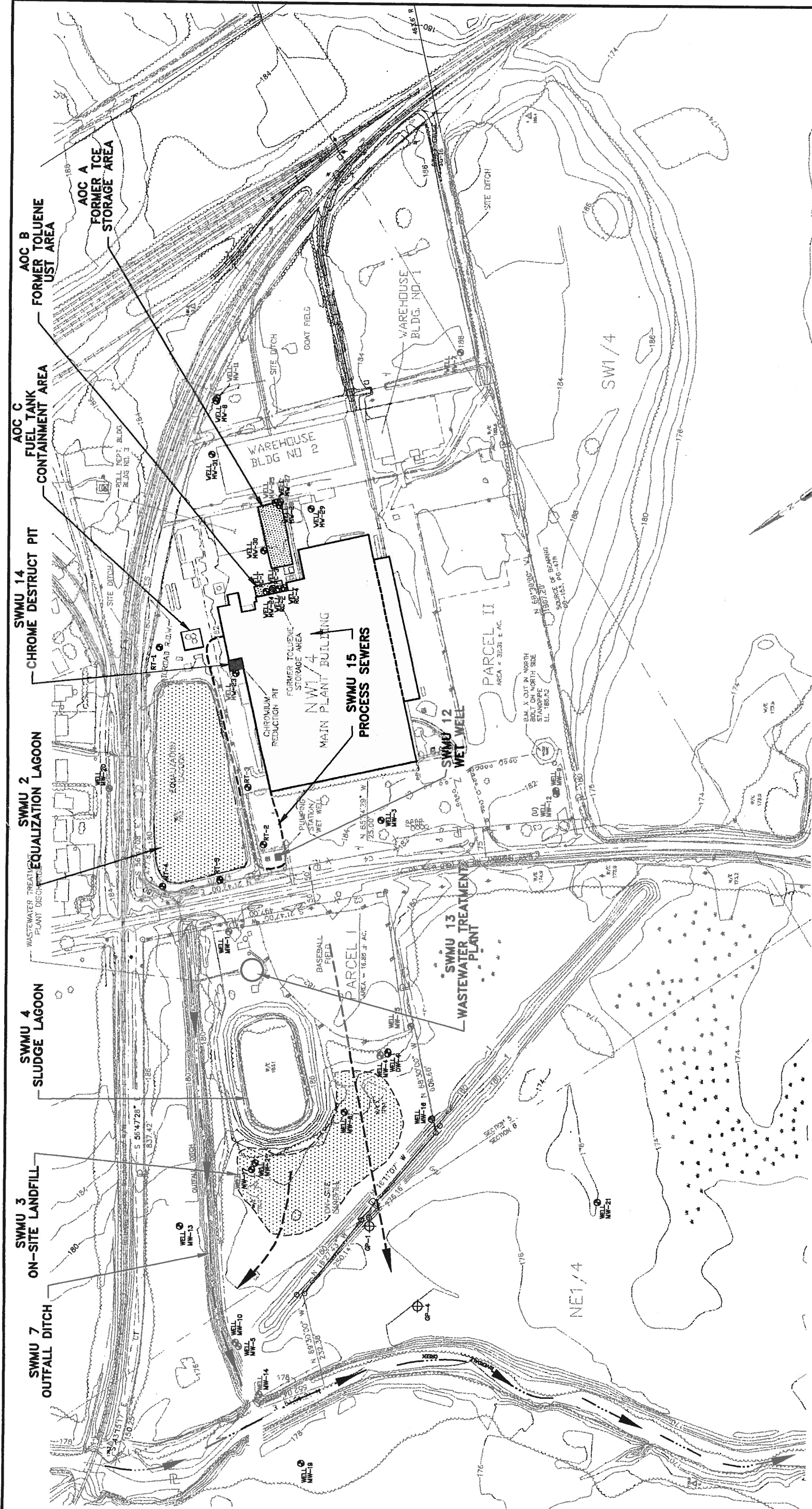


FIGURE 1-2

SITE MAP SHOWING LOCATIONS OF REMAINING SOLID WASTE MANAGEMENT UNITS AND AREAS OF CONCERN

GRENADA MANUFACTURING, LLC PLANT  
GRENADA, MISSISSIPPI

19071.001

06/02

BROWN AND CALDWELL

Nashville, Tennessee

NOTE: REMAINING SWMUs AND AOCs ARE THOSE LISTED IN TABLES A.1 AND A.3 OF APPENDIX A OF THE FACILITY HSWA PERMIT.

250 0 250 500

SCALE

FEET

LEGEND

Monitoring Well

Geoprobe Piezometer

Groundwater Flow Direction

Surface Water Flow Direction

SWMUs

2-EQUALIZATION LAGOON

3-ON-SITE LANDFILL

4-SLUDGE LAGOON

7-OUTFALL DITCH

12-WET WELL

13-WASTEWATER TREATMENT PLANT

14-CHROME DESTRUCT PIT

15-PROCESS SEWERS

AOCs

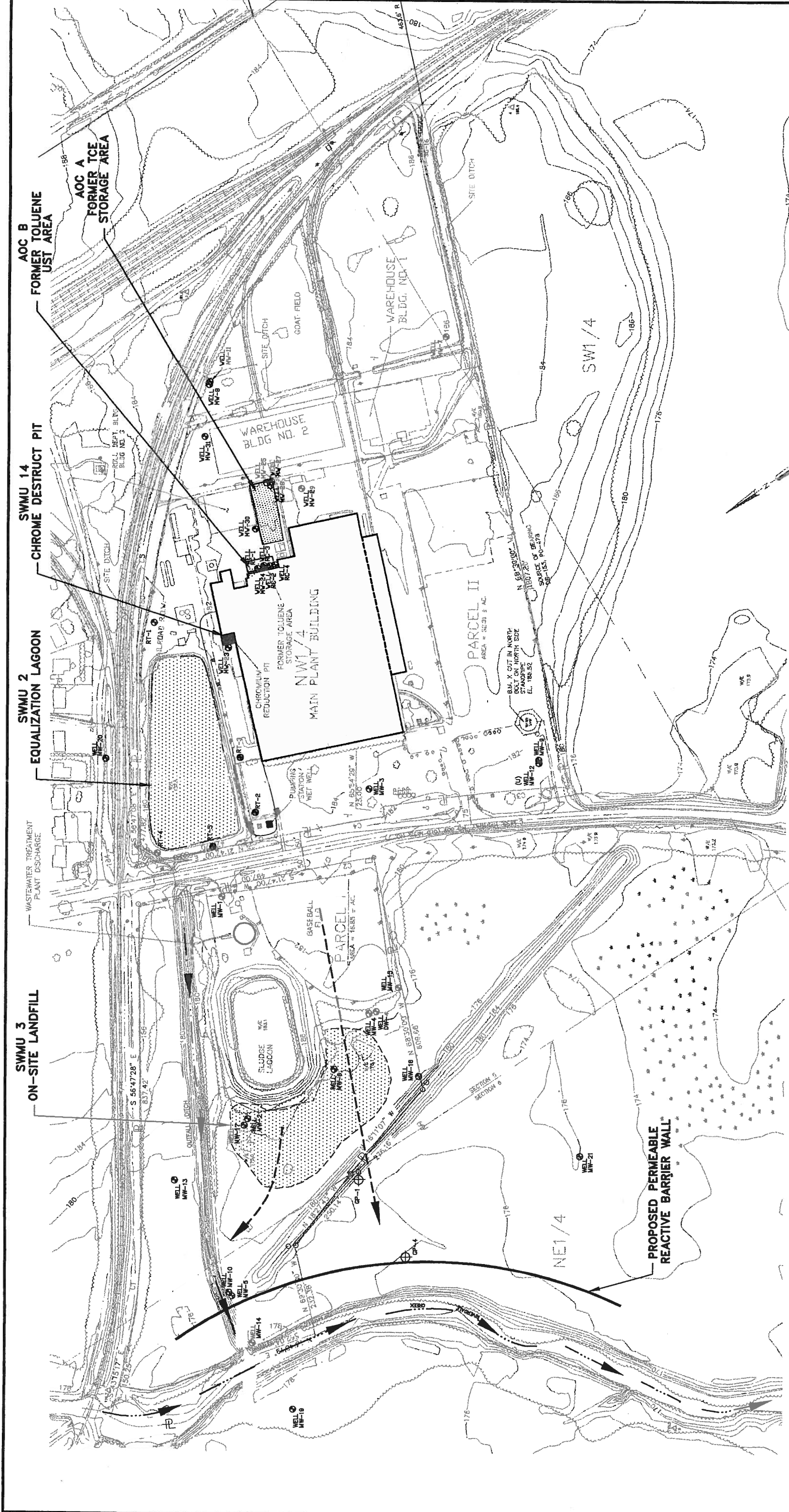
A-FORMER TCE STORAGE AREA

B-FORMER TOLUENE UST AREA

C-FUEL TANK FARM CONTAINMENT AREA

SOURCE: MAP PREPARED BY ALMON ASSOCIATES, 1993. WELL LOCATIONS SHOWN ARE APPROXIMATE.





**LEGEND**

- Monitoring Well
- Geoprobe Piezometer
- Groundwater Flow Direction
- Surface Water Flow Direction

**SWMUs**

- 2-EQUALIZATION LAGOON: CLOSED UNDER MDEQ JURISDICTION 1994
- 3-ON-SITE LANDFILL: SVE USED TO TREAT SOILS, CLOSED 1994
- 14-CHROME DESTRUCT PIT: CLEAN CLOSURE COMPLETED 2002

**AOCs**

- A-FORMER TCE STORAGE AREA: DNAPL RECOVERY SINCE 1993
- B-FORMER TOLUENE UST AREA: LNAPL RECOVERY SINCE 1993

**FIGURE 1-3**

**SITE MAP SHOWING**

**LOCATIONS OF INTERIM MEASURES**

GRENADA MANUFACTURING, LLC PLANT  
GRENADA, MISSISSIPPI

19071.001

**BROWN AND CALDWELL** Nashville, Tennessee

06/02

SOURCE: MAP PREPARED BY ALMON ASSOCIATES, 1993. WELL LOCATIONS SHOWN ARE APPROXIMATE.

## **1.1 PURPOSE**

Appendix C of the facility HSWA permit presents a list of elements to be included in the CMS Work Plan. The purpose of this CMS Work Plan is as follows:

- to present the objectives of the CMS;
- to present an overview of the process by which corrective measures technologies will be identified and evaluated; and
- to present an implementation plan for the CMS, including a proposed implementation schedule and an outline for the CMS Report.

A brief overview of IMs that have been completed, are ongoing, and are proposed is also presented in this Work Plan.

## **1.2 DESCRIPTION OF CURRENT SITUATION**

Rockwell Automotive North America, now ArvinMeritor, operated a wheel cover manufacturing facility in Grenada, Mississippi from 1966 to 1985 before selling the operations and property to Textron Automotive Company, formerly Randall Textron, who then sold the operations and property to Grenada Manufacturing, LLC in 1999. Grenada Manufacturing, LLC (Permittee) currently operates as a metal stamping facility with production of wheel covers as only a small portion of its total plant production. ArvinMeritor and Textron Automotive Company have conducted a number of environmental investigations at the referenced facility. The most extensive investigative work is reported in the 1994 Remedial Investigation (RI) Report conducted by ECKENFELDER INC., now Brown and Caldwell (BC). The work was performed in response to a Mississippi Department of Environmental Quality (MDEQ) Administrative Order of Consent designed to investigate the on-Site landfill, and was subsequently expanded to include other areas of the Site.

The RI conducted by ECKENFELDER INC. in January 1994 identified the presence of trichloroethylene (TCE) and its degradation products, as well toluene and chromium, in the soil and groundwater at the Site. A Baseline Risk Assessment (BRA) was performed for soil and Site groundwater as part of the Supplemental RI Report prepared by ECKENFELDER INC. in March 1994. The BRA provides an evaluation of the potential threat to human health and the environment from the constituents of interest at the Site. The risk assessment identifies the constituents of interest and, through the exposure and toxicity assessments, characterizes the associated potential risk, assuming no action is taken at the Site. The primary concern with respect to impacted groundwater is the migration of chlorinated ethenes and ethanes to Riverdale Creek. Toluene and chromium are also of concern, but are generally present at much lower concentrations than are the chlorinated volatile organic compounds (VOCs) and do not threaten Riverdale Creek. The results of that investigation are discussed on a Site-wide basis in the RI Report. The SWMUs and AOCs had not yet been determined at the time the report was submitted to the MDEQ.

The BRA results demonstrated that the Site poses only potential "low-level" threats for all media, except for groundwater from the uppermost aquifer, if it were used in the future as a drinking water supply. Evaluation of the groundwater risk estimates (particularly ingestion) indicated that the high risk estimates are primarily a function of the relatively high concentrations of the constituents present in the groundwater (e.g., TCE and 1,2-dichloroethene), and also a function of the associated toxicity of the detected constituents (e.g., arsenic and vinyl chloride). The BRA emphasized that there were no known current receptors to Site-impacted groundwater.

The BRA also discussed that the interim action area and the former solvent storage area are considered primary sources of Site-related constituents in soils. However, the risk estimates associated with solid from these areas indicate that exposure to soils does not present high levels of risk. In addition, although there is no likely human exposure to light non-aqueous phase liquid (LNAPL) and dense non-aqueous phase liquid (DNAPL) which have accumulated near the former solvent storage area, those areas are believed to be a continuing source of constituents to groundwater, as were the soils associated with the interim action area.

The BRA also noted that Riverdale Creek surface water is not believed to be associated with unacceptable risk to human receptors, although constituent plumes of TCE and 1,2-dichloroethene

in groundwater have spread as far west as Riverdale Creek, which may present concern for biota that may be present in the creek. Riverdale Creek receives groundwater discharge and surface water discharge from the Outfall Ditch (SWMU 7).

Subsequent to the submittal of the RI Report, the facility became subject to regulation under RCRA and a RCRA Facility Assessment (RFA) was performed by USEPA's contractor (A.T. Kearney, Inc., 1997) as part of the HSWA permit process for the facility in 1996 and 1997. The RFA report included the results from the Preliminary Review (PR) and Visual Site Inspection (VSI) performed by A.T. Kearney, Inc. The RFA resulted in the identification of 26 SWMUs and 3 AOCs.

On March 2, 1999, USEPA issued a combined RCRA Facility Investigation (RFI)/Confirmatory Sampling (CS) Work Plan call letter. ArvinMeritor and Textron requested a meeting at the Region IV office to review the results of the RI conducted for MDEQ and to identify potential data gaps. During a meeting held in May 1999 among the USEPA Region IV Project Manager and representatives from Textron, ArvinMeritor, and ArvinMeritor's consultant, BC, it was agreed that nearly all of the information that might be generated in an RFI/CS effort already existed. USEPA requested that summaries of data obtained subsequent to issuance of the 1994 RI Report be prepared and that the available data be organized by SWMU or AOC. That document, the Summary of Investigative Work (SOIW), was prepared by BC in response to that request and was transmitted to USEPA and MDEQ in July 1999.

Following the receipt of a USEPA letter dated April 11, 2000, a meeting was held on Site April 25 and 26, 2000 between representatives from Grenada Manufacturing, ArvinMeritor, MDEQ, the USEPA, and BC to discuss, among other things, an Interim Measures Work Plan and USEPA's acceptance of the SOIW in lieu of the draft RFI report. As stated in USEPA's letter, Grenada Manufacturing was also required to respond to comments on the SOIW and to revise and resubmit the SOIW as an RFI Report. Responses to comments on the SOIW were transmitted with the RFI Report. As agreed during the project meeting on April 25 and 26, transmittal of the Interim Measures Work Plan and the RFI Report (revised SOIW) were completed under separate schedules so that additional groundwater sampling and analyses could be performed as part of the implementation of the IM Work Plan. Once USEPA and MDEQ approval was received for the IM



Work Plan, field activities were performed and additional data were incorporated into the RFI Report, which was issued as revised Final in October 2001.

An evaluation of IMs for groundwater migration control was performed according to the IM Work Plan. In its letter to the USEPA dated March 9, 2001, BC presented the results of the focused IM evaluation. The evaluation considered three in-situ treatment technologies: a permeable reactive barrier (i.e., zero valence iron), an air sparging curtain, and enhanced bioremediation. After evaluation of these technologies as applied to Site-specific information, installation of a permeable reactive barrier (PRB) was recommended as the IM for groundwater migration control. Subsequently, BC submitted a Design Basis Report for the PRB to the USEPA and MDEQ for review on May 18, 2001. This Design Basis Report describes the scope of the design effort, a summary of the relevant Site conditions, the performance requirements of the PRB, and the design criteria.

The groundwater IM that has been proposed consists of installation of a PRB (see Figure 1-3 for the proposed location of the PRB). This IM has been proposed to address the overall Site groundwater contamination, since a large portion of the Site's groundwater is currently impacted by TCE and its degradation products. Additionally, there is a significant portion of the Site where chromium impacts groundwater. Groundwater at the Site appears to discharge primarily directly to Riverdale Creek. Potential impact to the creek appears to be limited to TCE and its degradation products. Groundwater may also enter the Outfall Ditch (SWMU 7), which discharges to Riverdale Creek. Impact to Riverdale Creek due to discharge of groundwater containing TCE and its degradation products has been identified as an environmental condition that could significantly benefit from implementation of the PRB as an IM.

The PRB is being designed to be capable of controlling impact to Riverdale Creek. When the PRB is installed, then the potential environmental impact from source areas, as well as the Site-wide plume, will be controlled. The CMS will consider additional source area treatment or removal activities that may provide a measurable benefit by improving the quality of groundwater reaching the PRB so that the efficacy of the PRB is improved or extended.

### 1.3 RCRA COMPLIANCE SCHEDULE

For this site, the RFI has been completed, including the BRA. Several IMs have also been implemented. The CMS Work Plan is being submitted by the agreed date of June 30, 2002. The CMS Report will be prepared and submitted in accordance with the schedule outlined in Section 5.1 of this Work Plan. Interim Measures Progress reports are being submitted semiannually in June and December at the request of the USEPA.

In its letter to Grenada Manufacturing dated April 4, 2002, the USEPA stated that no further action was necessary for the Chrome Destruct Pit (SWMU 14) based on the closure activities reported to the USEPA on March 27, 2002 by Global Environmental Solutions, Inc. (GESI) on behalf of Grenada Manufacturing. In the same April 4, 2002 letter, a Clean Closure Plan was approved by the USEPA for the Chrome Destruct Pit. According to Grenada Manufacturing, the final clean closure of SWMU 14 was completed by June 26, 2002.

During the closure activities for the Chrome Destruct Pit (SWMU 14), Grenada Manufacturing identified another SWMU and the USEPA has identified it as the Chrome Plating Area, SWMU 27. In its letter to Grenada Manufacturing dated April 4, 2002, the USEPA requested that Grenada Manufacturing provide the dates of operation of the Chrome Plating Area, a description of the hazardous wastes or constituents formerly managed at the area, and a physical description of the unit and its condition. The USEPA did not set a date by which this information would be provided; however, according to Grenada Manufacturing, a SWMU 27 Closure Work Plan and SWMU Assessment are due to the USEPA by July 25, 2002.

The remaining submittals noted in the Schedule of Compliance, included as Appendix D of the facility's existing RCRA Permit, are anticipated to follow that existing schedule. A copy of that schedule is included as Appendix B of this Work Plan for reference.

## 2.0 OVERVIEW OF INTERIM MEASURES

A number of source control interim measures have been previously implemented at the Site. These measures include installation of a DNAPL recovery system for TCE and installation of an LNAPL recovery system for toluene. Grenada Manufacturing expects to continue NAPL recovery as an ongoing interim measure. Another source control IM was ex-situ soil vapor extraction at an area designated as the On-Site Landfill (SWMU 3). Also, the Former Equalization Lagoon (SWMU 2) was closed under the oversight of MDEQ. Clean closure of the Chrome Destruct Pit (SWMU 14) has also been completed according to Grenada Manufacturing. Lastly, another proposed IM is the installation of a PRB. Each of these measures is briefly discussed in this section, as well as other on-Site activities that will be considered during the CMS.

### 2.1 PREVIOUS INTERIM MEASURES

An interim measure was previously implemented at the Site in 1994 from one area immediately northwest and a second smaller area immediately south of the existing sludge lagoon designated as the "On-Site Landfill" (SWMU 3, refer to Figure 1-3). That interim measure used ex-situ soil vapor extraction to treat approximately 9,000 cubic yards of soil. TCE impacted soil was removed and mixed with aggregate and lime using a road stabilizer fitted with an off-gas treatment system. Treated soil was then stockpiled, and when verified as meeting cleanup goals, returned to the excavation.

Additionally, the Former Equalization Lagoon (SWMU 2, refer to Figure 1-3) located northeast of the main building was closed under the jurisdiction of the MDEQ. In general, the closure activities consisted of the draining of the lagoon and removal and temporary consolidation of sludge and underlying soil within the eastern portion of the drained lagoon. An engineered liner was then constructed within the western portion of the lagoon and the sludge and underlying soil was placed within the lined area. An engineered landfill cover system was then constructed over the area. Lastly, the eastern portion of the former lagoon was allowed to refill with surface water runoff. Grenada Manufacturing has sampled and analyzed samples from groundwater compliance monitoring wells surrounding the Former Equalization Lagoon and of the Wastewater Treatment Plant effluent. The results of those efforts were described in the final RFI Report.

## 2.2 ONGOING INTERIM MEASURES

An automated DNAPL recovery system was installed in October 1993. The DNAPL recovery well is located between the plant building and the plant warehouse to the east in the vicinity of the Former TCE Storage Tank (AOC A). TCE is no longer used at the plant. The automated DNAPL recovery system was operated for a period of approximately three years until the system was no longer able to recover significant amounts of free-phase TCE. Currently, manual bailing on a monthly basis is used to recover residual amounts of DNAPL and it is anticipated that this recovery activity will continue.

An automated LNAPL recovery system was also installed in October 1993 to recover free phase toluene in the Former Toluene Underground Storage Tank (UST) Area (AOC B). Toluene use is currently limited to painting activities in an isolated area of the plant requiring only small containers. The LNAPL recovery system operated for a period of about two years and consisted of four wells located immediately behind the main building in the former area of the toluene underground storage tank. Currently, residual toluene is being recovered manually on a monthly basis and it is anticipated that this recovery activity will continue.

Based on groundwater monitoring results, monitoring well MW-2 (located near the sludge lagoon) has been added to the monthly NAPL monitoring program. Collection of both LNAPL and DNAPL is ongoing at MW-2. Further evaluation of the existing LNAPL and DNAPL recovery systems will be addressed as part of the CMS. The CMS evaluation will include continued operation, modified operation, or discontinuing operations.

As discussed in Section 1.3 of this Work Plan, closure activities for the Chrome Destruct Pit (SWMU 14) were completed according to the Closure Plan (approved September 2001) and no further action is necessary according to USEPA's letter to Grenada Manufacturing dated April 4, 2002. The clean closure for the Chrome Destruct Pit (SWMU 14) has been completed as of June 26, 2002, according to Grenada Manufacturing. Clean closure included filling the pit with clean backfill followed by construction of a six-inch concrete cover. During the closure activities for the Chrome Destruct Pit (SWMU 14), Grenada Manufacturing identified another SWMU and the USEPA has identified it as the Chrome Plating Area, SWMU 27. In its letter to Grenada



Manufacturing dated April 4, 2002, the USEPA requested that Grenada Manufacturing provide the dates of operation of the Chrome Plating Area, a description of the hazardous wastes or constituents formerly managed at the area, and a physical description of the unit and its condition. The USEPA did not set a date by which this information would be provided; however, according to Grenada Manufacturing, a SWMU 27 Closure Work Plan and SWMU Assessment are due to the USEPA by July 25, 2002. The chrome plating department was composed of three chrome-plating lines with 11 tanks in each line. The lines are each in a recessed area, three feet below the plant floor. The recessed in-ground plating lines are sloped to the Process Sewers (SWMU 15) so that the overflow from the tanks in the north half of each chrome line (tanks one through six) drained to the Wet Well (SWMU 12). These tanks did not contain any chromium. The tanks in the south half (tanks 7 through 11) of each line contained chromium, and the overflow from these tanks drained to the Chrome Destruct Pit (SWMU 14). These closure activities and associated SWMUs will be evaluated during the CMS.

### **2.3 PROPOSED INTERIM MEASURES**

As discussed in Section 1.2 of this Work Plan, the Design Basis Report has been submitted for the installation of a PRB as a groundwater interim measure. The design includes some modifications to the Outfall Ditch (SWMU 7) to improve the quality of groundwater reaching Riverdale Creek. The design (including plans, specifications, and monitoring plan) is being finalized for submission to the USEPA for approval.

### **2.4 OTHER ON-SITE ACTIVITIES TO BE CONSIDERED**

Several on-Site activities are being performed that will be considered during the CMS. These activities include integrity testing and monitoring of the Wet Well (SWMU 12). In a letter to the USEPA dated May 9, 2002, BC, on behalf of Grenada Manufacturing, submitted a schedule for this testing. The schedule for this integrity testing and monitoring is on a five-year basis with the first test to be conducted in the summer of 2002.

Also, active processes at the facility will be considered as the CMS is performed. These processes include the Waste Water Treatment Plant (WWTP), designated as SWMU 13, and the Process Sewers (SWMU 15) used as part of the chrome plating processes.

In it's letter dated June 14, 2002, the USEPA requested that Grenada Manufacturing prepare an Indoor Air Monitoring Work Plan to assist with the ongoing Vapor Intrusion to Indoor Air Pathway Assessment (Vapor Intrusion Assessment) for the facility. This Indoor Air Monitoring Work Plan is due to USEPA by August 1, 2002. This assessment will also be considered in the CMS process, as necessary.

### **3.0 OBJECTIVES OF THE CORRECTIVE MEASURES STUDY**

This section of the Work Plan presents a discussion of the CMS objectives, proposed target media cleanup standards, and preliminary points of compliance.

#### **3.1 SUMMARY OF OBJECTIVES**

The primary objective of the CMS is to identify and evaluate corrective measures that will control actual or potential human and environmental exposure to contaminants. The CMS will address constituents that have been identified during previous investigations, including the RFI. The CMS Report will include a detailed description of the evaluation and remedy selection process. The outcome of the CMS will be a recommended remedy for the Site.

As stated in Section 2, past, ongoing, and proposed interim measures will be evaluated as part of the CMS. NAPL recovery activities at AOC A (Former TCE Storage Area) and AOC B (Former Toluene UST Area) will be re-evaluated as part of the study.

Previously performed source control measures have been successful in terms of meeting their intended objectives. However, ongoing source control measures, such as the NAPL recovery systems, must also be evaluated as part of the CMS. The evaluation will address whether additional efforts are necessary, including continuing current operations or modifying those systems. Proposed additional measures (i.e., installation of the PRB, closure of the Chromium Destruct Pit, and evaluation of the Process Sewers) will also be evaluated as part of the CMS. The installation of the PRB will be evaluated as a Site-wide groundwater corrective action measure.

Additional data have been obtained during various post-closure activities and in conjunction with interim measures. These data are documented in separate reports, which have been previously submitted to the USEPA and/or MDEQ. Current Site information is sufficient to complete the evaluation of corrective measures. Therefore, no additional soil, groundwater, or surface water data collection is proposed as part of this evaluation. However, as requested by the USEPA, a one day site visit by a qualified person will be conducted to verify the results of an updated threatened and

endangered species literature search performed by BC, which was summarized in a letter to the USEPA dated May 9, 2002.

### **3.2 PROPOSED TARGET MEDIA CLEANUP STANDARDS**

Site-wide groundwater will be the primary focus of the corrective measures to be evaluated as part of the CMS. Currently, MDEQ allows for the use of groundwater Maximum Concentration Limits (MCLs) for target cleanup standards; these cleanup standards will be considered during the CMS. MDEQ also allows consideration of Alternative Standards (AS) for groundwater. Alternative Standards will also be considered as part of the CMS process.

It is not anticipated that cleanup standards will be required for soil and surface water at the Site. Based on the BRA results, soil and surface water do not pose a risk to the environment or to other receptors except in the fact that the soil and surface water can act as a source of contamination to groundwater. In Section 1.2 of this Work Plan, this interaction is further discussed. The role of soil and surface water contamination will be evaluated with respect to the impact that further remedial activities or achieving target cleanup standards can positively impact the overall Site-wide groundwater quality in addition to the interim measures that have already been performed, are ongoing, or are proposed. For example, there is one primary and a number of secondary potential source areas for TCE, some of which may not be easily accessed. Addressing hot spots particularly where DNAPL may exist may have minimal impact on groundwater quality unless TCE removal/destruction exceeds 95 percent or possibly 99 percent. Unless all significant source areas are adequately treated, impact to groundwater is likely to continue. Currently, available technologies have not, in general, been able to meet this requirement. Thus, additional source area treatment may not have long-term impact on the quality of groundwater reaching Riverdale Creek if the additional source area treatment cannot significantly decrease the amount of contaminants.

Also, based on the BRA, no target cleanup standards are anticipated to be needed for ambient air at the Site. As an extension of the RFI, a preliminary indoor air vapor intrusion assessment has been performed. A Work Plan will be developed to conduct indoor air sampling according to the USEPA's request.

### **3.3 PRELIMINARY POINTS OF COMPLIANCE**

The preliminary point of compliance for the selected corrective measures that will be recommended by the CMS Report is Riverdale Creek. As appropriate, other points of compliance will be considered during the CMS.

## **4.0 IDENTIFICATION AND EVALUATION OF CORRECTIVE MEASURES TECHNOLOGIES**

This section of the Work Plan presents an overview of the source control measures and migration control measures that will be considered in the CMS. A description is also presented for the process and criteria to be used to evaluate corrective measures technologies during the CMS.

### **4.1 SOURCE CONTROL MEASURES**

Source control measures will be evaluated as part of the CMS. The evaluation will focus, for example, on source control measures that may improve the life of the PRB. NAPL recovery activities at AOC A (Former TCE Storage Area) and AOC B (Former Toluene UST Area) will be re-evaluated as part of the study. The CMS will evaluate the additional data to help focus on additional source control activities that may be necessary. Consideration will be given to continuing current operations, modification of the existing systems, and potentially discontinuing recovery operations if it is determined that recovery is no longer meeting objectives given the amounts of NAPL being recovered.

SWMU 15 (Process Sewers) and SWMU 27 (Chrome Plating Area), including potential air releases from these areas of the plant, will be further evaluated as part of the CMS. The CMS will consider additional data collected since completion of the RFI to help focus any additional source control activities that may be necessary. Potentially applicable source control measures for the Process Sewers include slip-lining the existing below ground piping still being used or filling the pipes with concrete and installing aboveground piping. These measures would more likely be incorporated into and implemented as part of an overall or long-term change in operations to be decided by Grenada Manufacturing.

### **4.2 MIGRATION CONTROL MEASURES**

Potentially applicable groundwater migration control measures are those that minimize impacted groundwater from entering Riverdale Creek or those that could remove or destroy constituents of

concern so that groundwater entering the creek does not exceed cleanup concentration goals for each constituent. Based on available data, the groundwater constituents that are currently impacting the creek are TCE and its daughter products cis-1,2-dichloroethene (cis-DCE) and vinyl chloride (VC). The proposed installation of a PRB is expected to achieve migration control for these constituents that are impacting Riverdale Creek.

The CMS will consider other technologies that may be added to those already in place or planned (i.e., the PRB). These technologies will be evaluated to determine their potential to significantly improve migration control of TCE and its degradation products from reaching Riverdale Creek.

### 4.3 TECHNOLOGY EVALUATION

Appendix C of the facility HSWA permit lists the general guidelines and criteria to be used for identification, screening, and evaluating technologies during the CMS. The CMS Report will present a list and description of the applicable technologies for each of the affected media at the Site. A table or figure will be presented which summarizes this information. The corrective measures technologies will be screened to eliminate those that may prove infeasible to implement, that rely on technologies unlikely to perform satisfactorily or reliably, or that do not achieve the corrective measure objectives within a reasonable time period. The technologies that pass this screening step will be assembled into specific alternatives that have the potential to meet the corrective measure objectives for each media. These alternatives will be listed and briefly described in the CMS Report.

Appendix C of the facility HSWA permit lists the following criteria to be used in a more detailed evaluation of the alternatives:

- Protect human health and the environment.
- Attain media cleanup standards.
- Control the source of releases so as to reduce or eliminate, to the extent practicable, further releases that may pose a threat to human health and the environment.

- Comply with applicable standards for management of wastes.

Other factors or criteria that may be used to evaluate the alternatives include:

- long-term reliability and effectiveness
- reduction in the toxicity, mobility or volume of wastes
- short-term effectiveness
- implementability
- cost

Selection of one or more of the technologies will be based on the Site-specific conditions. Compatibility with other technologies that are ongoing or proposed at the Site also is a critical factor in selecting an alternative. For example, if an interim measure (such as the PRB) is based on reduction of TCE to ethene, it will be problematic to select as a corrective action alternative a technology upgradient of the barrier that is based on oxidation. For this reason, the evaluation process must consider ongoing and proposed interim measures. For this Site, we have anticipated that following implementation and testing of the PRB as a migration control system, it may be beneficial to apply a technology upgradient, most likely in one or more source areas, that would be at least compatible and preferably synergistic with the barrier. An example would be a technology that uses introduction of an electron donor to address the plume upgradient of the barrier. Thus, groundwater reaching the barrier would have a lower oxidation/reduction potential, as well as lower concentrations of constituents. Subsequently, the PRB might perform better and/or last longer.



## **5.0 IMPLEMENTATION OF CORRECTIVE MEASURES STUDY**

This section presents an overview of the plan for implementation of the CMS including a proposed schedule and an example format for the CMS Report.

### **5.1 PROPOSED SCHEDULE FOR CMS IMPLEMENTATION**

Figure 5-1 presents the proposed schedule for implementation of the CMS. Several assumptions have been made for this schedule:

- USEPA approval of this CMS Work Plan will be received by July 29, 2002 (30 days after submission of the Plan to USEPA),
- USEPA review of and comment on the draft CMS Report will require 30 days, and
- Final CMS Report will be submitted within 30 days after receipt of final comments from the USEPA.

### **5.2 PROPOSED OUTLINE FOR CMS REPORT**

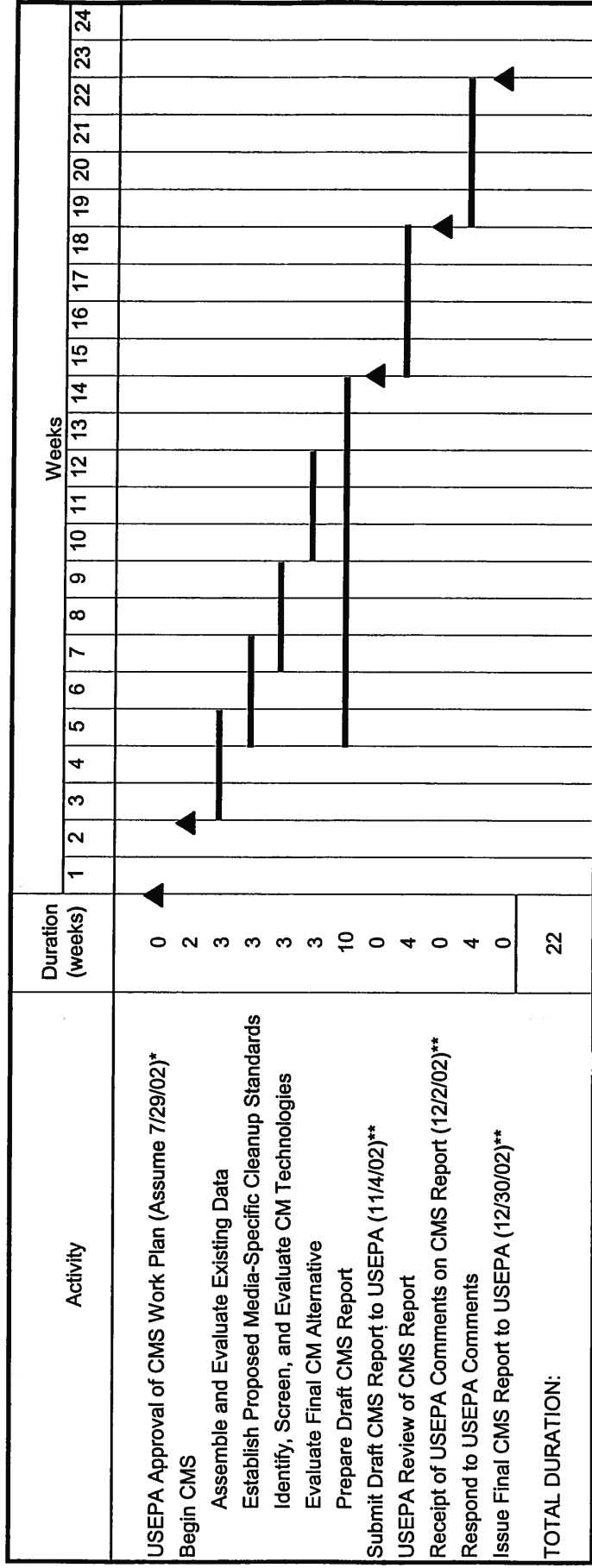
Table 5-1 presents the proposed outline for the CMS Report. This outline may be modified somewhat as the CMS Report is prepared; however, the CMS Report will contain the information required in Appendix C of the HSWA permit for the facility.

### **5.3 PROJECT ORGANIZATION AND MANAGEMENT**

Mr. John Bozick is the Project Manager for ArvinMeritor. Mr. Bozick has the overall responsibility for coordinating work activities at the Site; interfacing with Grenada Manufacturing, and the BC Project Manager; and communicating with the USEPA and MDEQ.

BC has been retained by ArvinMeritor to conduct the Corrective Measures Study. The BC Project Manager, Dale R. Showers, P.E., will be responsible for coordinating technical activities and

**Figure 5-1. Proposed Schedule for Corrective Measures Study Implementation**  
**Grenada Manufacturing, LLC**  
**Grenada, Mississippi**



**NOTES:**

\*Start date for CMS assumes receipt of USEPA approval of WP on 7/29/02.

\*\*Actual date depends on actual start date of CMS.

**TABLE 5-1**

**EXAMPLE OUTLINE  
CORRECTIVE MEASURES STUDY REPORT  
GRENADA MANUFACTURING SITE  
GRENADA, MISSISSIPPI**

1.0	Introduction .....
1.1	Purpose .....
1.2	Description of Current Situation .....
1.3	Establishment of Proposed Media Specific Cleanup Objectives .....
1.4	Continued Groundwater Sampling .....
1.5	Additional Groundwater Sampling .....
1.6	Continued NAPL Recovery .....
1.7	Shutdown of Chrome Plate Line .....
2.0	Identification and Development of Corrective Measures Technologies .....
2.1	Identification .....
2.2	Corrective Measures Development .....
3.0	Evaluation of Corrective Measures Technologies .....
3.1	Protection of Human Health and the Environment .....
3.2	Attainment of Media Cleanup Standards .....
3.3	Control of Sources of Releases .....
3.4	Compliance with Applicable Standards for Management of Wastes .....
3.5	Other Factors
3.5.1	Long-Term Reliability and Effectiveness .....
3.5.2	Reduction in the Toxicity, Mobility, or Volume of Wastes .....
3.5.3	Short-Term Effectiveness .....
3.5.4	Implementability .....
3.5.5	Cost .....
4.0	Justification and Recommendation of Corrective Measures .....
5.0	Implementation Schedule .....

directing BC personnel on the project, and will be the primary BC contact. Robert E. Ash, IV, P.E., of BC will act as the Principal-in-Charge with responsibility for the overall quality of the work. Project related activities will be managed by Mr. Showers from the BC Nashville, Tennessee office. BC personnel will be responsible for the establishment and monitoring of schedules, coordination of field activities, managing data, and performance of subcontractors. BC personnel will interface with subcontractors, laboratory and project personnel, and inform the Project Manager of all activities.

#### **5.4 DOCUMENT CONTROL**

Project documents will be controlled through an organized project filing system. Project and task numbers will be printed on each document. Analytical/technical files will include work products generated during the project. Field books, field observations, photographs, and other field related documents will be prepared and will also be placed in the project files. Laboratory sample results will be controlled, reviewed, and validated as defined in the Quality Assurance Project Plan (QAPP), dated November 2000. Original incoming documents will be date-stamped upon arrival and will be placed in the files.

#### **5.5 DATA MANAGEMENT**

Data received from the field, analytical laboratories, subcontractors, or private sources will be tabulated on a spreadsheet or database and will be subjected to quality control procedures, including comparing raw data to the original source, verifying calculations, and confirming data summaries. Data distribution will not occur until data review has been completed. Maps or drawings created using the data will be subjected to the review process.

Work products will be checked before final use. This includes checking calculations, reports, plans, etc. with various levels of review. The Project Manager will be responsible for the review of work as an element of his project responsibilities. The Principal-In-Charge is responsible for the overall quality of the work. One or more discipline-specific Technical Directors may be assigned by the Project Manager. Further, assignments may be made outside the project team, as needed, for quality control purposes; for example, utilizing personnel experienced in the monitoring and evaluation of natural attenuation data.

## **5.6 PUBLIC INVOLVEMENT PLAN**

Throughout the CMS process, Grenada Manufacturing and ArvinMeritor will assist the USEPA and the MDEQ with public involvement as needed.

**APPENDIX A**

**SOLID WASTE MANAGEMENT UNIT SUMMARY FROM HSWA PERMIT**

# APPENDIX A

## SOLID WASTE MANAGEMENT UNIT SUMMARY

A.1. List of solid waste management units (SWMUs) and areas of concern (AOCs) requiring a RCRA Facility Investigation (RFI):				
SWMU/AOC No/Letter	SWMU/AOC Name	Unit Comment	Dates of Operation	Potentially Affected Media <sup>1</sup>
SWMU 2	Equalization Lagoon	Surface Impoundment	1961-1994	A, SS, SW, GW, S
SWMU 3	On-Site Landfill	Landfill	1961-1967	A, SS, SW, GW, S
SWMU 4	Sludge Lagoon	Surface Impoundment	1977-Present	A, SS, SW, GW, S
SWMU 7	Outfall Ditch	Ditch	1961-Present	A, SS, SW, GW, S
SWMU 12	Wet Well	Inground Tank	1977-Present	A, SS, SW, GW, S
SWMU 14	Destruct Pit	Chromium Reduction Unit/ Holding Sump	1961-Present	A, SS, SW, GW, S
AOC A	Former TCE Storage Area	Contamination Area	≈1973-Present	A, SS, SW, GW, S
AOC B	Former Toluene UST Area	Contamination Area	Late 1960s-Present	A, SS, SW, GW, S

<sup>1</sup>Potentially Affected Media:

A - Air

SS- Subsurface Gas

SW - Surface Water

GW - Ground Water

S - Soil

**A.2. List of solid waste management units (SWMUs) and areas of concern (AOCs) requiring no further action at this time:**

SWMU/AOC No/Letter	SWMU/AOC Name	Unit Comment and Basis for NFA	Dates of Operation	Potentially Affected Media <sup>1</sup>
SWMU 1	Less Than 90-day Drum Storage Area	Container Storage Area	Mid 1980s-Present	NA
SWMU 5	Former Solid Waste Incinerators	Incinerators	1961-1996	NA
SWMU 6	Equipment Laydown	Laydown Area	1961-Present	NA
SWMU 8	Former Burn Area	Burn Area	1961-Approx. 1974	NA
SWMU 9	Sumps A, B, & C <sup>2</sup>	Sumps	1961-Present	NA
SWMU 10	Waste Oil Tank	Above-ground Storage Tank	1970s-Present	NA
SWMU 11	Waste Oil Catch Pans	Catch Pans	Approx. 1961- Present	NA
SWMU 16	Drainage Ditches	Ditches	1961-Present	NA
SWMU 17	Former IDW Drum Storage Area	Drum Storage Area	Early 1992-1993	NA
SWMU 18	Buffing Sludge Basement	Storage Basement	1961-Present	NA
SWMU 19	Buffing Sludge Rolloff	Rolloff Container	1985-Present	A, SS, SW, GW,S
* Unit Regulated by State Permit				



A.2. List of solid waste management units (SWMUs) and areas of concern (AOCs) requiring a no further action at this time (continued):				
SWMU/AOC No/Letter	SWMU/AOC Name	Unit Comment	Dates of Operation	Potentially Affected Media <sup>1</sup>
SWMU 20	Plant Waste Containers	Hoppers and Drums	1961-Present	NA
SWMU 21	Parts Washers	Parts Washers	Jan. 1990-Present	NA
SWMU 22	Cyclone Dust	Air Emissions Control	Approx 1960 - Present	NA
SWMU 23	Biohazard Container	Container	1960s-Present	NA
SWMU 24	Satellite Accumulation Areas A <sub>2</sub> , B <sub>2</sub> , C <sub>2</sub> , D <sub>2</sub> & E <sup>3</sup>	Satellite Accumulation Drums	Approx 1976 - Present	NA
SWMU 25	Scrap Metal Rolloffs	Rolloff Containers	1960s-Present	NA
SWMU 26	Trash Compactor	Compactor	1996-Present	NA

<sup>1</sup> Potentially Affected Media:

A - Air  
 SS- Subsurface Gas  
 SW - Surface Water  
 GW - Ground Water  
 S - Soil  
 NA - Not Applicable

<sup>2</sup> Sumps A, B & C are defined as follows

A Waste Oil Sump  
 B Main Waste Oil Sump  
 C Verson Press Waste Oil Sump

<sup>3</sup> Satellite Accumulation Areas A, B, C, D & E are defined as follows:

A Toluene Recovery Drum  
 B Waste Toluene Drum  
 C Spent Paint Filter Drum  
 D Waste Paint Rags Drum  
 E TCE Recovery Drum

A.3. List of solid waste management units (SWMUs) and areas of concern (AOCs) requiring Confirmatory Sampling:				
SWMU/AOC No/Letter	SWMU/AOC Name	Unit Comment	Dates of Operation	Potentially Affected Media
SWMU 13	Wastewater Treatment Plant	Treatment Plant	1977-Present	A, SS, SW, GW, S
SWMU 15	Process Sewers	Sewer System	1961-Present	A, SS, SW, GW, S
AOC C	Fuel Tank Farm Containment Area	Secondary Containment	1960s-Present	A, SS, SW, GW, S

<sup>1</sup>Potentially Affected Media:

A - Air

SS- Subsurface Gas

SW - Surface Water

GW - Ground Water

S - Soil

**APPENDIX B**

**COMPLIANCE SCHEDULE FROM HSWA PERMIT  
(APPENDIX D – SCHEDULE OF COMPLIANCE)**

Schedule of Compliance	Due Date
Notification of Newly Identified SWMUs and AOCs <i>Condition II.B.1. and Condition II.B.2.</i>	Within fifteen (15) calendar days of discovery
SWMU Assessment Report <i>Condition II.B.3.</i>	Within ninety (90) calendar days of notification
Notification for Newly Discovered Releases at Previously Identified SWMUs and AOCs <i>Condition II.C.1.</i>	Within fifteen (15) calendar days of discovery
Confirmatory Sampling Work Plan for SWMUs or AOCs identified in Appendix A.3 <i>Condition II.D.1</i>	Within forty-five (45) calendar days of notification by the Regional Administrator
Confirmatory Sampling Work Plan for SWMUs identified under Condition II.B.4. or AOCs identified under Condition II.B.1. <i>Condition II.D.2.</i>	Within forty-five (45) calendar days of notification by the Regional Administrator
Confirmatory Sampling Report <i>Condition II.D.5.</i>	In accordance with the approved CS Work Plan
RFI Work Plan for SWMU(s) and AOC(s) identified under Condition II.A.1. <i>Condition II.E.1.a.</i>	Within ninety (90) calendar days of notification by the Regional Administrator
RFI Work Plan for SWMU(s) and AOC(s) Identified under Condition II.B.4., Condition II.C.2., or Condition II.D.6. <i>Condition II.E.1.b.</i>	Within ninety (90) calendar days after receipt of notification by Regional Administrator (RA) which SWMUs or AOCs require an RFI
Draft RFI Report <i>Condition II.E.3.a.</i>	In accordance with the approved RFI Work Plan

Schedule of Compliance	Due Date
Final RFI Report <i>Condition II.E.3.c.</i>	Within thirty (30) calendar days after receipt of RA's final comments on Draft RFI Report
RFI Progress Reports <i>Condition II.E.3.d.</i>	Quarterly, beginning ninety (90) calendar days from the start date specified by the RA *
Interim Measures Work Plan <i>Condition II.F.1.a.</i>	Within thirty (30) calendar days of notification by RA
Interim Measures Progress Reports <i>Condition II.F.3.a.</i>	In accordance with the approved Interim Measures Work Plan ** or semi-annually for Permittee initiated IM
Interim Measures Report <i>Condition II.F.3.b.</i>	Within ninety (90) calendar days of completion
CMS Work Plan <i>Condition II.G.1.a.</i>	Within ninety (90) calendar days of notification by RA that a CMS is required
Implementation of CMS Work Plan <i>Condition II.G.2.</i>	Within fifteen (15) calendar days after receipt of RA approval of Plan
Draft CMS Report <i>Condition II.G.3.a.</i>	In accordance with the schedule in the approved CMS Work Plan
Final CMS Report <i>Condition II.G.3.a.</i>	Within thirty (30) calendar days of RA's final comments on Draft CMS Report
Demonstration of Financial Assurance <i>Condition II.H.3.</i>	Within one hundred twenty (120) calendar days after permit modification for remedy

Schedule of Compliance	Due Date
Noncompliance/Imminent Hazard Report <i>Condition I.D.14.</i>	Oral within 24 hours and written within fifteen (15) calendar days of becoming aware of the hazardous circumstances
Complete installation of emission control technology for units identified under <i>Condition IV.A.3.</i>	By "Installation Due Date" under Condition IV.A.3.
Written report of noncompliance of tanks, surface impoundments or containers with 40 CFR §§ 264.1082(c)(1) or (c)(2) <i>Condition IV.D.1.</i>	Within fifteen (15) calendar days of becoming aware of noncompliance
Written report of noncompliance of tanks with 40 CFR §§ 264.1084(c)(1) or (c)(2) <i>Condition IV.D.2.</i>	Within fifteen (15) calendar days of becoming aware of noncompliance
Semi-Annual Report for Use of Control Devices 40 CFR § 264.1090(c) <i>Condition IV.D.3.***</i>	Semi-annually, beginning six (6) months from the effective date of the permit*
<p>The above reports must be signed and certified in accordance with 40 CFR §270.11.</p> <p>* This applies to Work Plan execution that requires more than one hundred eighty (180) calendar days</p> <p>** This applies to Work Plan execution that requires more than one year.</p> <p>*** Semi-annual report is not required if provisions of Condition IV.D.4. are met</p>	